DOCUMENT RESUME

ED 238 882 SP 023 699

AUTHOR Wholeben, Brent E.
TITLE Structuring the Undergraduate Computer Literacy Curriculum for 4th Year Teacher Education Majors.
PUB DATE 2 Feb 84
NOTE 17p.; Paper presented at the Annual Meeting of the American Association of Colleges for Teacher Education (36th, San Antonio, TX, February 1-4, 1984).
PUB TYPE Speeches/Conference Papers (150) -- Reports - Descriptive (141) -- Guides - Non-Classroom Use (055)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Computer Assisted Instruction; *Computer Literacy; *Computer Science Education; *Course Content; *Curriculum Development; Education Majors; Higher Education; Preservice Teacher Education; Program Implementation; Programing; *Teaching Methods

ABSTRACT

This paper addresses primary objectives related to the design and execution of an instructional computing literacy curriculum for the fourth-year undergraduate teacher education major. The first objective discussed is the presentation of a rationale for providing computer literacy training in a preservice environment, as opposed to an inservice orientation. A discussion is presented on four distinct approaches to the provision of a continuum of computer literacy experiences: (1) the half-day, 3-hour awareness session; (2) the 1-day, 6-hour practicum session; (3) the 3-day, 18-hour developmental session; and (4) the 12-week (quarter or semester) incorporation session. Suggested instructional objectives syllabi and time-schedule outlines for each of these four approaches are offered and their sequences illustrated. Areas of training needs (e.g., system components evaluation and selection, the computer in instruction, etc.) are identified and their respective foci of instructional activity are enumerated. (Author/JD)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

STRUCTURING THE UNDERGRADUATE COMPUTER LITERACY CURRICULUM FOR 4TH YEAR TEACHER EDUCATION MAJORS

Dr. Brent E. Wholeben, Ph.D., E.M.T., Associate Professor
Department of Educational Administration and Supervision
The University of Texas at El Paso
El Paso, Texas 79968
(915) - 747-5355/5382

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Brent E. Wholeben
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
✓ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

Presented at the 1984 Annual Conference of the
American Association of Colleges of Teacher Education (AACTE)
San Antonio (Texas), February 2, 1984

ED238882

Abstract

This paper addresses three (3) primary objectives related to the design and execution of an instructional computing literacy curriculum for the fourth year, undergraduate teacher education major. These objectives, in their order of presentation, are: (1) present a rationale for providing computer literacy training to the 4th year teacher education student in a preservice environment, as opposed to an inservice orientation during a teacher-contract year, (2) discuss four (4) distinct approaches to the provision of a continuum of computer literacy experiences for the 4th year teacher education major ((i) the half-day (3-hour) awareness session, (ii) the one-day (6-hour) practicum session, (iii) the three-day (18-hour) developmental session, and (iv) the 12-week (quarter or semester) incorporation session), and (3) illustrate suggested instructional-objectives syllabi and time-schedule outlines for each of the four approaches identified in (2) above.

Reactions and comments pertinent to this manuscript are welcome; and should be forwarded directly to the author at the above address. All permission requests for duplication and/or distribution should be expressed in writing on formal letterhead, and directed to the author.

ALL RIGHTS RESERVED

SP023 699

INTRODUCTION

The advent of instructional computing technology for student learning continues unstructured and uncontrolled. While many teacher training institutions desire to provide instructional computing literacy training for their 4th year teacher education candidates, declining budgets prevent these organizations from inaugurating new curricula. For the majority of the colleges of education in American colleges and universities, the optimal approach to computer literacy training will require the development of computer literacy curricular components within existing teacher training courses at the upper-division level.

At the 1983 Annual Meeting of the National Educational Computing Conference in Baltimore, this author presented the first in a series of lectures on the topic of instructional computing literacy for undergraduate teacher education majors, where the proposed training sessions would be conducted prior to a teacher education graduate's first classroom teaching appointment (refer to: A Computer Literacy Curriculum for Preservice Teacher Education Candidates (Wholeben, Brent E.) November 05, 1982). The underlying rationale in this first paper addressed the need to incorporate computer literacy training within the curricula already established by College of Education curriculum committees. The majority of this training would be conducted during the internship semester of the teacher education major.

This present paper goes beyond this earlier work, and designs computer literacy intervention strategies which would be executed during the final two semesters of the teacher education major's study -- the semester before the internship and the intership semester itself. Three specific areas of focus, addressing these training objectives, will be discussed:

Objectives:

[1] PRESENT a rationale for providing computer literacy training to the 4th year teacher education student in a preservice environment, as opposed to an inservice orientation during a teacher-contract year;

[2] DISCUSS four (4) distinct approaches to the provision of a continuum of computer literacy experiences for the 4th year teacher education major: (i) the half-day (3-hour) awareness session, (ii) the one-day (6-hour) practicum session, (iii) the three-day (18-hour) developmental session, and (iv) the 12-week (quarter or semester) incorporation session; and,

[3] ILLUSTRATE suggested instructional-objectives syllabi and time-schedule outlines for each of the four approaches in [2] above.

PRESERVICE V. INSERVICE TRAINING APPROACH

A great deal of discussion and debate permeates higher education presently with regards to the value and significance of training at the preservice (or pre-graduation) versus the inservice (or post-employment) levels. While the importance of inservice training must not be minimized as a significant on-going professional development activity, the acquisition of certain fundamental skills prior to their incorporation within the daily activities of the classroom must be recognized.

At least seven areas of influence point to the usefulness of the preservice environment as opposed to on-the-job (inservice) training.

The influence of the time element, and its relationship to scheduling, is demonstrative of the value of the preservice orientation. The student during undergraduate training has much greater time available for instruction than does the teacher who must negotiate a daily, six-hour instructional classload. The scheduling of the preservice approach has greater flexibility since more of the day is available, opposed to the inservice orientation which must depend upon late afternoons and early evenings.

A second influence is that of availability of equipment and materials for instruction and practice. Instructional computing laboratories, for example,

are typically more accessible and versatile at a College of Education than would be expected in a local school building. Facilities at a college would also be complemented by the availability of knowledgeable 'training' professionals, while local schools might base their instruction on the more individual user-experience of the inservice provider. The influence of trainer expertise is third in our list of 'preservice advocates', and addresses the need that computer literacy trainers be 'trained' trainers, not simply experienced users of the technology.

A fourth influence, the learning orientation of the teacher, may also be best addressed in a preservice setting. Typically, pre-degree teacher education majors are more oriented to the structure of the student-learning orientation than might be found with employed classroom teachers who must return to the 'classroom' for additional after-hours study.

The necessary control of the training process is facilitated more effectively by a preservice setting rather than an inservice setting, largely because of the orientation of preservice as the primary activity, whereas inservice is secondary to a primary activity of classroom teaching. Related to the learning orientation and its required control is that of a heightened ability to practice with supervision that the preservice setting offers.

The seventh and last influence of the preservice setting introduces the expanded opportunity for the preservice teacher education major to interact with similar as well as different discipline-oriented colleagues under less time constrained circumstances than would be available in the inservice setting.

THE 14 IMMEDIATE NEEDS OF INSTRUCTIONAL COMPUTING LITERACY TRAINING

Whether preservice or inservice oriented, not less than fourteen (14) areas of training needs can be identified with respect to the instructional computing literacy training of the classroom teacher. These areas and their respective foci of instructional activity are enumerated below.

The Computer as Hardware

Primary Foci: Identify the various types of computers, and their parts, names and uses; demonstrate how the parts are configured to form the basic hardware computer system; identify various advanced hardware equipment and their uses; and discuss the strengths and limitations of the different hardware systems by type and size.

The Computer as Software

Primary Foci: Identify the more typical types and names of operating systems and programming languages, and discuss how they operate individually and in coordination with each other; identify typical operating system commands and their functions; discuss the more typical uses for the standard programming languages (compilers); and demonstrate how to use operating system commands and select utility packages for enhancing the use of the computer.

The Computer in Today's Society

Primary Foci: Identify the more typical uses of the computer in such areas as education, business, industry and social services; discuss specific examples of computer use which are most relevant to the context of class members' interests; provide the opportunity for guest speakers and/or short field trips to settings which utilize data processing activities; and discuss the legal issues relevant to the use of computers in education as well as the moral implications for the use of the computer in the instruction of young, maturing children.

Programming the Computer

Primary Foci: Demonstrate the basic structure of source-code program writing by (1) executing sample simple programs written in the BASIC language, (2) directing the students to view the effects of such execution, and then (3) studying the actual program listing which produced the output display; and direct a progressive, individualized introduction of the student to BASIC programming via the use of sequential sets of structured programming exercises.

The Computer in Instruction

Primary Foci: Discuss how the computer can be utilized to facilitate the teaching environment and individual student learning episodes; identify the six areas (generic) of computer-assisted individualization and how they impact differentially various learning objectives; and discuss the various cognitive, affective and psychomotor implications which using computers for assisting instruction have for both the student and the teacher.

Computer-Assisted Instruction (CAI)

Primary Foci: Identify the 12 components of computer-assisted instruction, denote how each component addresses the learning episode, and discuss how these components guide the learning process collectively; direct a student hands-on demonstration of CAI within the framework of the individual student's discipline area; direct a subsequent hands-on demonstration of CAI within discipline areas unrelated to the

student's primary teaching field; and demonstrate how a CAI developer would proceed to design courseware strategies for the development of new instructiona. software.

Computer-Managed Instruction (CMI)

Primary Foci: Identify the 12 components of computer-managed instruction and discuss how these components manage students' individualized learning processes; direct a student hands-on demonstration of CMI within the framework of the individual student's discipline area; direct a subsequent hands-on demonstration of CMI within discipline areas unrelated to the student's primary teaching field; and demonstrate how CMI packages are drafted preliminarily to facilitate the design of CAI delivery systems.

LOGO and Heuristic Discovery

Primary Foci: Discuss the utility of the LOGO programming structure(s) for heuristic-based learning using graphics, word lists and music media; and direct a progressive, individualized introduction of the student to LOGO via the use of sequential sets of structured programming exercises.

CAI/CMI Evaluation and Selection

Primary Foci: Discuss the importance of courseware assessment from each of the CAI and CMI orientations; identify sample criteria which will prove generally useful in such courseware evaluations; enumerate specific criterion referen-

ces which will guide a structured evaluation of courseware, demonstrate the technique of courseware evaluation; guide the individual student's practice assessment of select CAI/CMI courseware; and describe the procedures for assessing teaching/learning needs and delineating the necessary curriculum prior to the evaluation of available courseware.

System Components Evaluation and Selection

Primary Foci: Discuss the importance of hardware systems and their accurate configuration for instructional use, and the necessity for the adequate evaluation of this system as part of the overall CAI/CMI assessment; identify sample criteria which will generally prove useful in system evaluations; enumerate specific criterion references which will guide the structured evaluation of instructional hardware systems; guide the individual student's practice assessment of a sample instructional hardware system; and describe how to design computer hardware systems for instruction based upon a priori identified needs.

Scheduling the Computer for Instruction

Primary Foci: Discuss the importance of adequate system scheduling, the typical situations which are encountered normally in terms of system scheduling for instruction, and the problems most likely to be encountered; describe how to approach different situations in terms of scheduling scant resources, and how to develop the schedule; and demonstrate how to design and disseminate standard-form schedules, and monitor their subsequent use.

CAI/CMI Validation

Primary Foci: Discuss the importance of validating the use of computers for instruction; illustrate sample techniques for validation and the questions which can be answered; describe how to plan and execute a grading period based validation program; and discuss how to identify criteria for use in validation, and how to design validation strategies which are broad curriculum based.

CAI/CMI Development Using the BASIC Language

Primary Foci: Direct the individual student's development of a small scale, single CAI unit application utilizing the BASIC programming language as a software medium.

CAI/CMI Development Using the PILOT Language

Primary Foci: Direct a progressive, individualized introduction of the student to the PILOT CAI-development language via the use of sequential sets of structured programming exercises; and guide the student's individual development of a single, small-scale, CAI unit application utilizing the PILOT language.

Special Applications of the Computer to Education

Primary Foci: Discuss the specific uses of the computer in such typical areas of school administration as educational support services, testing and diagnostic evaluation, special

education and training of the handicapped, and building-level and district-level management; and identify typical situations in which the inadequately trained teacher (or other professional) might promote the abuse or misuse of this data processing resource.

THE TIME CONTINUUM DELIVERY SYSTEM

Structuring the undergraduate computer literacy curriculum for 4th year teacher education majors is accomplished in two semesters:

Semester 1 involves the general introduction of the student to the idea of instructional computing, its potential for enhancing the classroom learning environment, and its basic rudiments in terms of development and implementation,

whereas,

Semester 2 requires the student to address a sequential understanding of how to prepare classroom activities for the actual introduction to the curriculum of the use of electronic data processing activities.

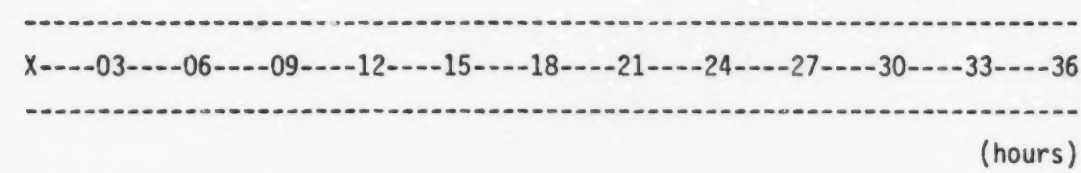
The first semester requires from 21-24 hours of training time, such training being delineated into two alternative regimens: either a 3-hour (or awareness) or 6-hour (or practicum) session, coupled with a followup 3-day workshop (or developmental) which builds upon these basic, introductory sessions. The suggested implementation of these first-semester activities could proceed as part of the required discipline methods course(s).

The second semester requires the student to participate in a 36-hour course (called incorporation) which guides the student's gradual development of actual computer-assisted strategies for subsequent application in an actual classroom

environment. The suggested implementation of this second semester course could proceed in conjunction with the student's internship.

Please refer to the following schematic for a graphic depiction comparing these four training sequences.

THE TIME CONTINUUM FOR COMPUTER LITERACY TRAINING



(½-day)

X====>

(Awareness)

MISSION: Introductory Discussion of General Topics
(suggested implementation: Methods Course)

(1-day)

X==========>

(Practicum)

MISSION: Hands-On Demonstration of General Principles
(suggested implementation: Methods Course)

(3-day)

X==================================>

(Developmental)

MISSION: Longitundinal Experience for Individual Use
(suggested implementation: Methods Course)

(1-semester)

X===>

(Incorporation)

MISSION: Preparation for Future Application(s)
(suggested implementation: during Internship)

Based upon these scheduling constraints, the general instructional activity framework of the undergraduate computer literacy curriculum can now be identified, and the supporting activities enumerated.

DEVELOPMENTAL ACTIVITIES OF THE COMPUTER LITERACY DELIVERY SYSTEM

Parallel to the fourteen immediate training needs for instructional computing literacy (described in a previous section of this paper) a specific, detailed training syllabus will be presented.

To be effective, a training syllabus must accomplish several simultaneous motives:

[1] identify the various training activities which must guide the execution of a training episode(s),

[2] articulate the relationship of each activity to the specific developmental objective to be fulfilled,

[3] demonstrate the sequential (developmental) lineage of subsequent activities with prior ones, and

[4] show the necessary time allocation which should (might) be extended to each objective - activity pair.

These syllabic requirements have been satisfied in the following tables of training exercises.

(Table of Training Activities, Part I)

	AWARENESS (½-Day (3-Hour))	PRACTICUM (1-Day (6-Hours))	DEVELOPMENTAL (3-Days (18-Hours))	INCORPORATION (1-Semester (36-Hours))
THE COMPUTER AS HARDWARE	types, parts, names and uses (0:30)	how to connect parts and use advanced equipment (0:30)	strengths and limitations of different systems (0:30)	review (0:30)
THE COMPUTER AS SOFTWARE	operating systems and programming languages (0:15)	typical OS commands and uses for differ program lang (0:15)	how to use OS lang and various utility packages (0:15)	review (0:30)
THE COMPUTER IN TODAY'S SOCIETY	uses in education, business, industry and soc svc (0:15)	specific examples in context of class interest (0:15)	guest speakers a/o field trip (3:00)	legal issues and moral implications (0:30)
PROGRAMMING THE COMPUTER	sample BASIC progrms (RUN - view - LIST) (0:30)	structured program exercises I (1:00)	structured program exercises II (2:00)	review (1:00)
THE COMPUTER IN INSTRUCTION	how does the computer teach and help stud learn (0:30)	six areas of computer-assisted individualization (0:15)		cognitive, affective and psychomotor implications (1:00)
COMPUTER-ASSISTED INSTRUCTION - CAI	12 components and how they guide student learning (0:30)	H/O demon of CAI regarding individual stud discipl (0:30)	H/O demon of CAI across all students' disciplines (1:15)	design strategies for individual proj development (3:00)
COMPUTER-MANAGED INSTRUCTION - CMI	12 components and how they manage student learning (0:30)	H/O demon of CMI regarding individual stud discipl (0:30)	H/O demon of CMI across all students' disciplines (":"")	how to design delivery systems and review results (3:00)
LOGO AND HEURISTIC DISCOVERY		structured program exercises I (0:30)	structured program exercises II (3:00)	

(Table of Training Activities, Part II)

	AWARENESS (½-Day (3-Hour))	PRACTICUM (1-Day (6-Hours))	DEVELOPMENTAL (3-Days (18-Hours))	INCORPORATION (1-Semester (36-Hours))
CAI/CMI EVALUATION AND SELECTION		importance of assess and sample criteria (0:30)	specific criteria, technique and use on two packages (2:00)	how to assess needs and delineate curriculum (6:00)
SYSTEM COMPONENTS EVALUATION AND SELECTION		importance of assess and sample criteria (0:30)	specific criteria/ technique related to CAI/CMI eval (":"")	how to design syst based upon identif'd needs (1:00)
SCHEDULING THE COMPUTER FOR INSTRUCTION		importance, typical situations and their problems (0:15)	how to approach different situations and dev sched (0:30)	how to design, disseminate and monitor schedules (1:00)
CAI/CMI VALIDATION		importance of valid and illustrative approaches (0:30)	how to plan/exec a grading period based validation (0:30)	how to ident crit and design a valid strategy (1:00)
CAI/CMI DEVELOPMENT USING BASIC LANGUAGE			student project for program single CAI application (2:00)	
CAI/CMI DEVELOPMENT USING PILOT LANGUAGE			structured program exercises (tutorial) (3:00)	devel an individual CAI/CMI project for discipline (15:00)
SPECIAL APPLICATIONS		uses in educational support services and management (0:30)		typical abuse/misuse situations for using sch computer (0:30)
INDIVIDUAL PROJECT DEMONSTRATIONS				individual present and demonstrations (2:00)

What is lacking in the these tables, of course, are specific references to reference materials, and the actual structured exercises which are to be presented to the student. While the author is continuing to develop these (himself), it might be wise for the reader (future trainer) to commence developing their own materials, since computer literacy training is very much an individual matter, and inspires an almost personal flavor in terms of the trainers' aspirations for the students in his/her tutelage.

LOOKING AHEAD TO A GRADUATE-LEVEL ARTICULATION

As with most curriculum development projects, one is never done with one event before starting a 'sequel' or extension activity. Such is the case here.

The author is working currently on a three-semester program at the graduate level which will better prepare the classroom teacher for the appropriate and adequate use of computer-assisted learning techniques in the classroom. Included in the three semester approach are specific training objectives which prepare the participant to be a computer literacy provider at both the student as well as teacher level.

Contrary to the undergraduate approach which is still under review at the author's university for implementation, the three semester approach is entering the second semester of its pilot validation sequence, under an inservice orientation.